

## General representation (stellarator)

### 1.1 overview

The general representation for plasma boundary is in **generic**. The basic fomulation is

$$\begin{aligned} R &= \sum R_{mn}^c \cos(m\theta - n\zeta) + R_{mn}^s \sin(m\theta - n\zeta) \\ Z &= \sum Z_{mn}^c \cos(m\theta - n\zeta) + Z_{mn}^s \sin(m\theta - n\zeta) \end{aligned}$$

Usually, if we imply stellarator symmetry, then  $R_{mn}^s$  and  $Z_{mn}^c$  would be zero.

The positive driection for poloidal angle  $\theta$  is **counterclockwise** and for toroidal angle is also **counterclockwise** from the top view. The positive surface normal should be pointed outwards.

### 1.2 Variables

The Fourier harmonics of the plasma boundary are reqired in **plasma.boundary**, and the format of this file is as follows:

```
Nfou ! integer: number of Fourier harmonics for the plasma boundary;
Nfp ! integer: number of field periodicity;
NBnf ! integer: number of Fourier harmonics for Bn;
-----
bim(1:bm) ! integer: poloidal mode identification;
bin(1:bm) ! integer: toroidal mode identification;
Bnim(1:bm)! integer: poloidal mode identification, for Bn;
Bnin(1:bm)! integer: toroidal mode identification, for Bn;
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Rbc(1:bm) ! real : cylindrical R cosine harmonics;
Rbs(1:bm) ! real : cylindrical R sine harmonics;
Zbc(1:bm) ! real : cylindrical Z cosine harmonics;
Zbs(1:bm) ! real : cylindrical Z sine harmonics;
Bns(1:nbf) ! real : B normal sin harmonics;
Bnc(1:nbf) ! real : B normal cos harmonics;
```

Note that immediately after reading (and broadcasting) **bin**, the field periodicity factor is included, i.e. **bin = bin \* Nfp**.

### 1.3 Sample file

Example of the plasma.boundary file:

```
#Nfou Nfp NBnf
4 2 1
#plasma boundary
# n m Rbc Rbs Zbc Zbs
0 0 3.00 0.0 0.0 0.00
0 1 0.30 0.0 0.0 -0.30
1 0 0.00 0.0 0.0 -0.06
1 1 -0.06 0.0 0.0 -0.06
#Bn harmonics
# n m bnc bns
0 0 0.0 0.0
```

## Knotran

The input surface file for knotrans is described in [knotxx](#).

## Tokamak

This part is reserved for later development of the interface for tokamaks.